What is claimed is:

1. A gas sensor manufacturing method comprising the steps of:

preparing an assembly which has a length and includes (a) a housing which has a length made up of a first end portion, a second end portion, and a flange between the first and second end portions, (b) a cover which is made up of a small-diameter portion, a large-diameter portion, and a shoulder formed between the small-diameter portion and the large-diameter portion, (c) a first insulation porcelain disposed in the large-diameter portion of the cover in contact with the shoulder through an elastic member, (d) a second insulation porcelain disposed in the housing in contact of an end thereof with an end of the first insulation porcelain in alignment with each other, and (e) a laminated sensor element disposed in the second insulation porcelain;

pressing the cover against the housing in a lengthwise direction of said assembly to fit an end of the large-diameter portion of the cover on the first end portion of the housing to form an overlap;

tacking the large-diameter portion of the cover to the first end portion of the housing at the overlap while pressing the cover against the housing;

rotating said assembly about the length thereof; and

welding the large-diameter portion of the cover to the first end portion of the housing over the overlap.

2. A gas sensor manufacturing method as set forth in claim 1, wherein said pressing steps presses the cover against the housing while compressing the elastic member to urge the second insulation porcelain against an inner wall of the housing elastically to establish a hermetic seal between an outer wall of the second insulation porcelain and the inner wall of the housing.

3. A gas sensor manufacturing method as set forth in claim 1, wherein said welding step is performed while pressing the cover against the housing.

4. A gas sensor manufacturing method as set forth in claim 1, wherein pressure exerted on the cover is released after the tacking step.

5. A gas sensor manufacturing method as set forth in claim 1, said welding step is performed by laser welding.

6. A gas sensor manufacturing method as set forth in claim 1, said tacking step makes at least two tack welds in the overlap of the cover and the housing.

7. A gas sensor manufacturing method comprising the steps of:

preparing an assembly which has a length and includes (a) a housing which has a length made up of a first end portion, a second end portion, and a flange between the first and second end portions,

(b) a cover which is made up of a small-diameter portion, a large-diameter portion, and a shoulder formed between the small-diameter portion and the large-diameter portion, and (c) an insulation porcelain disposed in the large-diameter portion of the cover in contact with the shoulder through an elastic member, (d) a cup-shaped sensor element disposed in the housing;

pressing the cover against the housing in a lengthwise direction of said assembly to fit an end of the large-diameter portion of the cover on the first end portion of the housing to form an overlap;

tacking the large-diameter portion of the cover to the first end portion of the housing at the overlap while pressing the cover against the housing;

rotating said assembly about the length thereof; and

welding the large-diameter portion of the cover to the first end portion of the housing over the overlap.

8. A gas sensor manufacturing method as set forth in claim 7, wherein said pressing steps presses the cover against the housing while compressing the elastic member to urge the sensor element against an inner wall of the housing elastically to establish a hermetic seal between an outer wall of the sensor element and the inner wall of the housing.

9. A gas sensor manufacturing method as set forth in claim 7, wherein said welding step is performed while pressing the cover

against the housing.

10. A gas sensor manufacturing method as set forth in claim 7, wherein pressure exerted on the cover is released after the tacking step.

11. A gas sensor manufacturing method as set forth in claim 7, said welding step is performed by laser welding.

12. A gas sensor manufacturing method as set forth in claim 7, said tacking step makes at least two tack welds in the overlap of the cover and the housing.

13. A gas sensor manufacturing method comprising the steps of:

preparing an assembly which has a length and includes (a) a housing which has a length made up of a first end portion, a second end portion, and a flange between the first and second end portions, (b) a cover which is made up of a small-diameter portion, a large-diameter portion, and a shoulder formed between the small-diameter portion and the large-diameter portion, (c) a first insulation porcelain disposed in the large-diameter portion of the cover in contact with the shoulder through an elastic member, (d) a second insulation porcelain disposed in the housing in contact of an end thereof with an end of the first insulation porcelain in alignment with each other, and (e) a laminated sensor element disposed in the second insulation porcelain;

pressing the cover against the housing in a lengthwise direction of said assembly to fit an end of the large-diameter portion of the cover on the first end portion of the housing to form an overlap; and

welding the large-diameter portion of the cover to the first end portion of the housing at the overlap while pressing the cover against the housing.

14. A gas sensor manufacturing method as set forth in claim 13, wherein said pressing steps presses the cover against the housing while compressing the elastic member to urge the second insulation porcelain against an inner wall of the housing elastically to establish a hermetic seal between an outer wall of the second insulation porcelain and the inner wall of the housing.

15. A gas sensor manufacturing method as set forth in claim 13, wherein said welding step is performed while rotating the cover and the housing.

16. A gas sensor manufacturing method as set forth in claim 13, wherein said welding step is performed while fixing the cover and the housing.

17. A gas sensor manufacturing method as set forth in claim 13, wherein said welding step welds the large-diameter portion of the cover to the first end portion of the housing around an overall

periphery of the overlap.

18. A gas sensor manufacturing method as set forth in claim 17, wherein said welding step welds the large-diameter portion of the cover to the first end portion of the housing around an overall periphery of the overlap through laser welding.

19. A gas sensor manufacturing method comprising the steps of:

preparing an assembly which has a length and includes (a) a housing which has a length made up of a first end portion, a second end portion, and a flange between the first and second end portions, (b) a cover which is made up of a small-diameter portion, a large-diameter portion, and a shoulder formed between the small-diameter portion and the large-diameter portion, and (c) an insulation porcelain disposed in the large-diameter portion of the cover in contact with the shoulder through an elastic member, (d) a cup-shaped sensor element disposed in the housing;

pressing the cover against the housing in a lengthwise direction of said assembly to fit an end of the large-diameter portion of the cover on the first end portion of the housing to form an overlap; and

welding the large-diameter portion of the cover to the first end portion of the housing at the overlap while pressing the cover against the housing.

20. A gas sensor manufacturing method as set forth in claim 19,

wherein said welding step is performed while rotating the cover and the housing.

21. A gas sensor manufacturing method as set forth in claim 19, wherein said welding step is performed while fixing the cover and the housing.

22. A gas sensor manufacturing method as set forth in claim 19, wherein said welding step welds the large-diameter portion of the cover to the first end portion of the housing around an overall periphery of the overlap.

23. A gas sensor manufacturing method as set forth in claim 22, wherein said welding step welds the large-diameter portion of the cover to the first end portion of the housing around an overall periphery of the overlap through laser welding.

24. A gas sensor manufacturing method comprising the steps of:

preparing an assembly which has a length and includes (a) a housing which has a length made up of a first end portion, a second end portion, and a flange between the first and second end portions, (b) a cover which is made up of a small-diameter portion, a large-diameter portion, and a shoulder formed between the small-diameter portion and the large-diameter portion, (c) a first insulation porcelain disposed in the large-diameter portion of the cover in contact with the shoulder through an elastic member, (d) a

second insulation porcelain disposed in the housing in contact of an end thereof with an end of the first insulation porcelain in alignment with each other, and (e) a laminated sensor element disposed in the second insulation porcelain;

pressing the cover against the housing in a lengthwise direction of said assembly until a pressure exerted on the housing reaches a given pressure level to fit an end of the large-diameter portion of the cover on the first end portion of the housing to form an overlap; and

welding the large-diameter portion of the cover to the first end portion of the housing at the overlap while pressing the cover against the housing.

25. A gas sensor manufacturing method as set forth in claim 24, wherein said pressing steps presses the cover against the housing while compressing the elastic member to urge the second insulation porcelain against an inner wall of the housing elastically to establish a hermetic seal between an outer wall of the second insulation porcelain and the inner wall of the housing.

26. A gas sensor manufacturing method as set forth in claim 24, wherein said given pressure level is 1.2 times greater than or equal to an elastic pressure produced by the elastic member.

27. A gas sensor manufacturing method comprising the steps of: preparing an assembly which has a length and includes (a) a

housing which has a length made up of a first end portion, a second end portion, and a flange between the first and second end portions, (b) a cover which is made up of a small-diameter portion, a large-diameter portion, and a shoulder formed between the small-diameter portion and the large-diameter portion, and (c) an insulation porcelain disposed in the large-diameter portion of the cover in contact with the shoulder through an elastic member, (d) a cup-shaped sensor element disposed in the housing;

pressing the cover against the housing in a lengthwise direction of said assembly until a pressure exerted on the housing reaches a given pressure level to fit an end of the large-diameter portion of the cover on the first end portion of the housing to form an overlap; and

welding the large-diameter portion of the cover to the first end portion of the housing at the overlap while pressing the cover against the housing.

28. A gas sensor manufacturing method as set forth in claim 27, wherein said pressing steps presses the cover against the housing while compressing the elastic member to urge the sensor element against an inner wall of the housing elastically to establish a hermetic seal between an outer wall of the sensor element and the inner wall of the housing.

29. A gas sensor manufacturing method as set forth in claim 27, wherein said given pressure level is 1.2 times greater than or equal

to an elastic pressure produced by the elastic member.

30. A gas sensor manufacturing machine designed to produce a gas sensor using an assembly which has a length and includes (a) a housing which has a length made up of a first end portion, a second end portion, and a flange between the first and second end portions, (b) a cover which is made up of a small-diameter portion, a large-diameter portion, and a shoulder formed between the small-diameter portion and the large-diameter portion, (c) a first insulation porcelain disposed in the large-diameter portion of the cover in contact with the shoulder through an elastic member, (d) a second insulation porcelain disposed in the housing in contact of an end thereof with an end of the first insulation porcelain in alignment with each other, and (e) a laminated sensor element disposed in the second insulation porcelain, said machine comprising:

a first annular press plate fitted on the first end portion of the housing in engagement with the flange;

a second annular press plate fitted on the small-diameter portion of the cover in engagement with the shoulder of the cover; and

pressing means for pressing the cover against the housing in a lengthwise direction of said assembly to fit an end of the large-diameter portion of the cover on the first end portion of the housing to form an overlap;

tacking means for tacking the large-diameter portion of the cover to the first end portion of the housing at the overlap while

pressing the cover against the housing;

rotating means for rotating the assembly; and

welding means for welding the large-diameter portion of the cover to the first end portion of the housing over the overlap.

31. A gas sensor manufacturing machine as set forth in claim 30, wherein said tacking means and said welding means are implemented by a welding machine including welding heads which are rotatable around said overlap.

32. A gas sensor manufacturing machine as set forth in claim 31, wherein the welding heads are so placed as to be diametrically opposed to each other diametrically around said ovelap.

33. A gas sensor manufacturing machine designed to produce a as sensor using an assembly which has a length and includes (a) a housing which has a length made up of a first end portion, a second end portion, and a flange between the first and second end portions, (b) a cover which is made up of a small-diameter portion, a large-diameter portion, and a shoulder formed between the small-diameter portion and the large-diameter portion, and (c) an insulation porcelain disposed in the large-diameter portion of the cover in contact with the shoulder through an elastic member, (d) a cup-shaped sensor element disposed in the housing, said machine comprising:

a first annular press plate fitted on the first end portion of the

housing in engagement with the flange;

a second annular press plate fitted on the small-diameter portion of the cover in engagement with the shoulder of the cover; and

pressing means for pressing the cover against the housing in a lengthwise direction of said assembly to fit an end of the large-diameter portion of the cover on the first end portion of the housing to form an overlap;

tacking means for tacking the large-diameter portion of the cover to the first end portion of the housing at the overlap while pressing the cover against the housing;

rotating means for rotating the assembly; and

welding means for welding the large-diameter portion of the cover to the first end portion of the housing over the overlap.

34. A gas sensor manufacturing machine as set forth in claim 33, wherein said tacking means and said welding means are implemented by a welding machine including welding heads which are rotatable around said overlap.

35. A gas sensor manufacturing machine as set forth in claim 34, wherein the welding heads are so placed as to be diametrically opposed to each other around said overlap.